

# A ZigBee-Based Wireless Sensor Network for Continuous Sound and Noise Level Monitoring on the ISS, Phase II

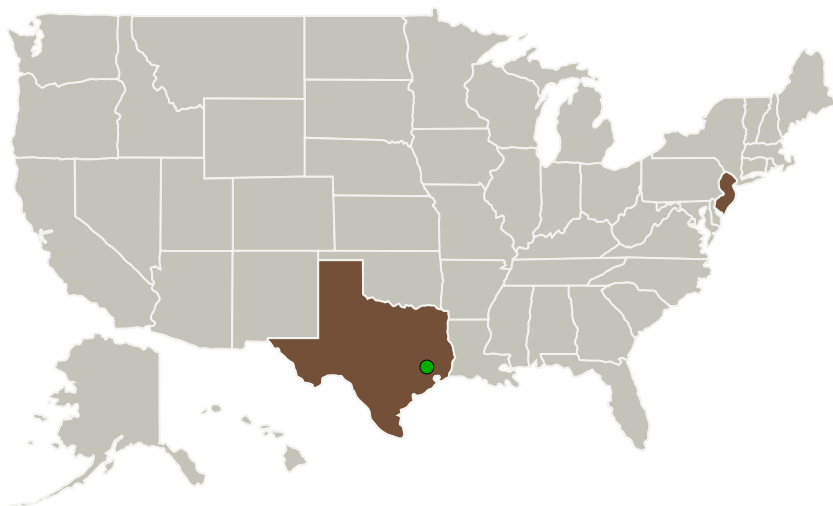
Completed Technology Project (2012 - 2014)



## Project Introduction

The International Space Station (ISS) needs to keep quiet to maintain a healthy and habitable environment in which crewmembers can perform long-term and uninterrupted scientific research under microgravity conditions. Acoustic survey is now performed once every two months using hand-held devices at 60 locations on the ISS. It takes a significant amount of precious crew time and the sporadic monitoring program is not adequate. NASA has defined a need for an automated, continuous acoustic monitoring system that is efficient in power consumption (long battery life), accurate, highly integrated, wireless connected, scalable, small and lightweight. WeVoice Inc. proposed to develop a ZigBee-based wireless sensor network for acoustic monitoring to meet the challenges. During Phase I of this projects, three essential capabilities were developed, tested, and validated: \* The design of a data collection subsystem that integrates measurement microphones and the feasibility of using the state-of-the-art MEMS microphones. \* The development of accurate and computationally efficient signal processing algorithms for acoustic frequency (octave, 1/3-octave, and narrowband) analysis and sound level measurement. \* The construction of a ZigBee network for data communication. In addition, the WeVoice SBIR research team has started working on flight-like devices. Clear directions for improvement were established for the Phase II efforts that may follow. The Phase II program focuses on system integration and optimization, software implementation, and graphical user interface development. An in-situ calibration plan will be suggested and a demonstrable system will be delivered to NASA for testing in a ground facility at the completion of the Phase II contract. So the expected TRL then is expected to reach 6.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
WEVOICE, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Bridgewater, New Jersey
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

## Primary U.S. Work Locations

New Jersey	Texas
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## Project Transitions

**April 2012:** Project Start**April 2014:** Closed out

**Closeout Summary:** A ZigBee-Based Wireless Sensor Network for Continuous Sound and Noise Level Monitoring on the ISS, Phase II Project Image

**Closeout Documentation:**

- Final Summary Chart Image(<https://techport.nasa.gov/file/137857>)

## Images

### Briefing Chart Image

A ZigBee-Based Wireless Sensor Network for Continuous Sound and Noise Level Monitoring on the ISS, Phase II  
(<https://techport.nasa.gov/image/>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

WEVOICE, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

Yiteng A Huang

### Co-Investigator:

Yiteng (arden) Huang

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## Technology Maturity (TRL)

Start: **4**  
Current: **6**  
Estimated End: **6**



## Technology Areas

### Primary:

- TX10 Autonomous Systems
  - └ TX10.1 Situational and Self Awareness
    - └ TX10.1.1 Sensing and Perception for Autonomous Systems

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System